

I claim:

1. A metal working machine comprising;

(a) a substantially rectangular, stationary frame having a right side and a left side, the stationary frame having right and left columns rigidly connected by top and bottom beams,

(b) a moving frame having a right side and a left side, the moving frame including right and left vertical members that are pivotably joined with top and bottom horizontal members, the moving frame mounted to the stationary frame so that the top and bottom horizontal members of the moving frame may slide along substantially vertical paths relative to the left and right columns of the stationary frame as the right and left vertical members of the moving frame move along substantially vertical paths that are next to and substantially parallel with the right and left columns of the stationary frame,

(c) a right actuator and a left actuator each respectively connecting the right side of the moving frame to the right side of the stationary frame and the left side of the moving frame to the left side of the stationary frame, each actuator operable between an unextended position and an extended position, the right and left actuators controllable by a control to operate in unison so that both sides of the moving frame move in unison, the right and left actuators also controllable to operate independently so that one side of the moving frame may be moved while the other side remains substantially stationary,

(d) at least one pair of tool dies including a first tool mounted to the stationary frame and a corresponding second tool mounted to the moving frame, the first and second tools mounted to corresponding locations on the stationary frame and the moving frame so that when a workpiece is placed between the first tool and the second tool, an operation may be performed on the workpiece as the second tool moves relative to the first tool as at least one of the right or left actuators is operated between the unextended position and the extended position.

2. The metal working machine of claim 1, wherein,

the right and left actuators are hydraulic cylinders served by independently controllable hydraulic circuits.

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3. The metal working machine of claim 1, wherein,

the tool dies include pairs of tool dies selected from the group consisting essentially of (1) a first pair of tool dies in an opposite corresponding relationship including a tool die fixed to the bottom beam of the stationary frame between the columns thereof and a second tool die fixed to the bottom horizontal member of the moving frame between the vertical members thereof, (2) a second pair of tool dies in an opposite corresponding relationship including a tool die fixed to the top beam of the stationary frame between the columns thereof and a second tool die fixed to the top horizontal member of the moving frame between the vertical members thereof, (3) a third pair of tool dies in an opposite corresponding relationship including a tool die fixed to the stationary frame toward the right end thereof and a tool die fixed to moving frame toward the right end thereof, and (4) a fourth pair of tool dies in an opposite corresponding relationship including a tool die fixed to the stationary frame toward the left end thereof and a tool die fixed to moving frame toward the left end thereof.

4. The metal working machine of claim 1, further comprising:

at least one limit switch coupled with the actuators, the limit switch including a finger and a switch mounted to corresponding portions of the moving frame and the stationary frame so that when the finger contacts the switch to stop the motion of the moving frame relative to the stationary frame when a predetermined degree of motion of the moving frame relative to the stationary frame has occurred.

5. The metal working machine of claim 1, further comprising:

at least one limit switch coupled with the actuators, the limit switch including a member and a switch that are mounted to corresponding portions of the moving frame and the stationary frame so that the relative distance between the finger and the switch can be changed and so that when the finger contacts the switch, the motion of the moving frame relative to the stationary frame stops when

the moving frame has moved relative to the stationary frame by a pre-selected amount.

5 6. The metal working machine of claim 1, further comprising:

10 at least two limit switches coupled with the actuators, the limit switches mounted on opposite sides of the machine, each limit switch including a finger and a switch mounted to corresponding portions of the moving frame and the stationary frame so that when the finger contacts the switch, the motion of the actuator mounted on the same side of the metal working machine as the limit switch stops when the moving frame has moved relative to the stationary frame by a pre-selected amount.

15 7. The metal working machine of claim 1, further comprising:

20 at least two limit switches coupled with the actuators, the limit switches mounted on opposite sides of the machine, each limit switch including a finger and a switch mounted to corresponding portions of the moving frame and the stationary frame so that the relative distance between the finger and the switch can be changed and so that when the finger contacts the switch, the motion of the actuator mounted on the same side of the metal working machine as the limit switch stops when the moving frame has moved relative to the stationary frame by a pre-selected amount.

25 8. A metal working machine comprising;

30 (a) a substantially rectangular, stationary frame having a right side and a left side, the stationary frame having right and left columns rigidly connected by at least a first tool support beam and a second tool support beam positioned above the first tool support beam,

(b) a moving frame having a right side and a left side, the moving frame including right and left vertical members that are pivotably joined with top and bottom horizontal members, the moving frame mounted to the stationary frame so that the top and bottom horizontal members of the moving frame may slide along substantially vertical paths relative to the left and right columns of the stationary

frame as the right and left vertical members of the moving frame move along substantially vertical paths that are next to and substantially parallel with the right and left columns of the stationary frame,

(c) pairs of corresponding tool dies fixed to the stationary frame and the moving frame selected from the group consisting of: (1) a first pair of tool dies in an opposite corresponding relationship including a tool die fixed to the first tool support beam of the stationary frame between the right and left columns thereof and a tool die fixed to the bottom horizontal member of the moving frame between the vertical members thereof, (2) a second pair of tool dies in an opposite corresponding relationship including a tool die fixed to the second tool support beam of the stationary frame between the right and left columns thereof and a tool die fixed to the top horizontal member of the moving frame between the vertical members thereof, (3) a third pair of tool dies in an opposite corresponding relationship including a tool die fixed to the stationary frame toward the right end thereof and a tool die fixed to moving frame toward the right end thereof, and (4) a fourth pair of tool dies in an opposite corresponding relationship including a tool die fixed to the stationary frame toward the left end thereof, and a tool die fixed to moving frame toward the left end thereof,

(d) a right hydraulic cylinder and a left hydraulic cylinder, the right hydraulic cylinder connecting the moving frame to the stationary frame by connecting between a portion of the moving frame toward the right end thereof and a portion of the stationary frame toward the right end thereof, the left hydraulic cylinder connecting the moving frame to the stationary frame by connecting between a portion of the moving frame toward the left end thereof and a portion of the stationary frame toward the left end thereof, the right and left hydraulic cylinders operable between unextended positions and extended positions, each hydraulic cylinder coupled to a hydraulic circuit, each hydraulic circuit operable in a down mode wherein the hydraulic cylinder coupled thereto moves so that the portion of the moving frame attached thereto moves down, an up mode wherein the hydraulic cylinder coupled thereto moves so that the portion of the moving frame attached thereto moves up and a neutral mode wherein the hydraulic cylinder coupled thereto does not move, each hydraulic circuit controllable by a control to

5 operate in unison so that both ends of the moving frame move in unison or controllable by separate controls so that each end of the moving frame may be moved independently, so that working operations may be performed that are selected from a group of operations consisting essentially of (1) an operation performed on a workpiece placed between a pair of tool dies selected from the group consisting of the first and second pairs of tool dies as the hydraulic cylinders move substantially in unison (2) an operation performed on a workpiece placed between a pair of tool dies selected from the group consisting of the third and fourth pairs of tool dies as the hydraulic cylinders move substantially in unison, and (3) an operation performed on a workpiece placed between a pair tool dies selected from the group consisting of the third and fourth pairs of tool dies as only the hydraulic cylinder mounted toward the same end of the metal working machine 10 as the selected pair of tool dies is moved.

15 9. The metal working machine of claim 8, further comprising:

20 at least two limit switches coupled with the control that controls the hydraulic cylinders, the limit switches mounted on opposite sides of the machine, each limit switch including a finger and a switch mounted to corresponding portions of the moving frame and the stationary frame so that when the finger contacts the switch, the motion of the hydraulic cylinder mounted on the same side of the metal working machine as the limit switch stops moving when a predetermined degree of motion of the moving frame relative to the stationary 25 frame has occurred.

30 10. The metal working machine of claim 8, further comprising:

at least two limit switches coupled with the with the control that controls the hydraulic cylinders, the limit switches mounted on opposite sides of the machine, each limit switch including a finger and a switch mounted to corresponding portions of the moving frame and the stationary frame so that the relative distance between the finger and the switch can be adjusted and so that when the finger contacts the switch, the motion of the hydraulic cylinder mounted on the same side of the metal working machine as the limit switch stops moving when a

predetermined degree of motion of the moving frame relative to the stationary frame has occurred.

11. The metal working machine of claim 8, wherein:

the first and second pairs of tool dies are configured to provide a break form die and sheet metal shear.

12. The metal working machine of claim 8, wherein:

the first pair of tool dies is a female break form die fixed to the first tool support beam of the stationary frame and a corresponding male break form die fixed to the bottom horizontal member of the moving frame, and the second pair of tool dies is a pair of corresponding sheet metal shear blades fixed to the second tool support beam of the stationary frame and the top horizontal member of the moving frame.

13. The metal working machine of claim 8, wherein:

the first and second pairs of tool dies are configured to provide a break form die and sheet metal shear, and wherein,

the second and third pairs of tool dies are configured to provide a shear and a hole punch tool.

14. The metal working machine of claim 8, wherein:

the first pair of tool dies is a female break form die fixed to the first tool support beam of the stationary frame and a corresponding male break form die fixed to the bottom horizontal member of the moving frame, and the second pair of tool dies is a pair of corresponding sheet metal shear blades fixed to the second tool support beam of the stationary frame and the top horizontal member of the moving frame, and wherein,

the second and third pairs of tool dies are configured to provide a shear and a hole punch tool.